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ABSTRACT

Initial efforts to validate a developmentally appropriate assessment system for use with children aged 3 to 7 years are described. The Project Construct Assessment System is part of a comprehensive framework for curriculum and assessment that is predicated on the theory that children construct their own knowledge. It features a variety of performance-based methods that can be used to monitor students' progress on 26 curricular goals. Extensive validation procedures, which include traditional methods as well as newer approaches proposed specifically for performance assessments, have been incorporated into the construction of the assessment system. Initially, 15 members of a statewide advisory group of educators evaluated the specifications for the instrument. Parts were pilot tested by over 100 teachers, and the proposed Goals for Students of the project were validated through a survey responded to by 647 early childhood teachers and school administrators in Missouri (represents a 38 percent response rate). The development of the Project Construct Assessment System demonstrates that consensus between measurement specialists and educators from other fields can be achieved through collaboration. One table presents information about the validation survey. Appendixes contain the Goals for Students and an example of a curriculum specification. (SLD)

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VALIDATION OF A DEVELOPMENTALLY APPROPRIATE ASSESSMENT SYSTEM FOR EARLY CHILDHOOD EDUCATION

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Abstract

This paper describes the initial efforts to validate a developmentally appropriate assessment system for use with children ages three through seven. The system is part of a comprehensive framework for curriculum and assessment that is predicated on the theory that children construct their own knowledge. It features a variety of performance-based methods that can be used to monitor students' progress on 26 curricular goals. Extensive validation procedures, which include traditional methods as well as newer approaches proposed specifically for performance assessments, have been incorporated into the construction of the assessment system.

Validation of a Developmentally Appropriate Assessment System for Early Childhood Education

During the past few years, many individuals and groups have criticized traditional methods of evaluating the developmental progress of young children (e.g., Kamii, 1990; NAEYC, 1988; NASBE, 1988). Early childhood educators, policy makers, school administrators, and others prefer that progress be assessed using developmentally appropriate, performance-based instruments and procedures that are consistent with current views of curriculum and with the ways in which young children learn (e.g., NAESP, 1990; NAEYC & NAECS/SDE, 1991; Schultz, 1989).

In response to this call for reform in testing practices in early childhood education, the Missouri Department of Elementary and Secondary Education (MDESE) is developing the Project Construct Assessment System, a set of performance-based, developmentally appropriate instruments for use with children ages three through seven. There are, however, numerous challenges and questions associated with this approach to assessment, many of which have to do with the development and validation of performance-based instruments.

The purposes of this paper are threefold: (a) to describe the initial processes used to validate a developmentally appropriate, performance-based assessment system for use in early childhood education; (b) to identify the standards and expectations that have informed the validation process; and (c) to delineate future validation efforts. The validation procedures

necessarily extend beyond the instruments themselves to the larger framework for curriculum and assessment that subsumes the assessment system, and the paper addresses these as well.

Description of Assessment System

Based on Constructivist Theory

The Project Construct Assessment System is part of a process-oriented framework for curriculum, instruction, and assessment that is based on the theory that children construct their own knowledge and values as a result of interactions with the physical and social world (Missouri Department of Elementary and Secondary Education, 1991; Murphy & Baker, 1990). This theory, known as constructivism, has its roots in the work of Piaget (e.g., 1929/1960, 1936/1952) and has been applied to early childhood education by Kamii (e.g., 1982, 1985) and DeVries (e.g., 1984).

Integrated with Curriculum and Instruction

The Project Construct Assessment System is also based on the following principles: (a) assessment and evaluation are integral parts of instruction, (b) assessment instruments should be aligned with curricular goals and objectives, (c) assessment activities should mirror good instructional strategies, and (d) assessment and evaluation should yield information that can be utilized to improve instruction.

The Project Construct Assessment System can be used to monitor a young child's progress toward attainment of 26 curricular goals in four interrelated developmental domains: Sociomoral, Cognitive, Representational, and Physical. (The

Project Construct Goals for Students are listed in Appendix A.) Each goal is defined by a Curriculum and Assessment Specification that provides parameters for teaching and assessment. (An example of a specification is presented in Appendix B.)

Developmentally Appropriate

The Project Construct Assessment System is being developed to be consistent with the NAEYC & NAECS/SDE (1991) guidelines for developmentally appropriate assessment of young children. Salient recommendations in this position statement include the following: (a) curriculum, instruction, and assessment should be integrated; (b) assessment (and curriculum and instruction) should address all developmental domains; and (c) assessment should be beneficial to the child and have utility for the teacher. The guidelines also state that progress should be measured by teachers (a) in a regular and ongoing manner, (b) in natural rather than artificial contexts, and (c) through the use of a variety of performance-based data-collection methods, such as work samples, observations, and interviews.

Another expression of the characteristics of developmentally appropriate assessment is offered by Gnezda, Garduque, and Schultz (1991). Their list of the "elements of alternative assessment" (p. 15) is similar to the NAEYC & NAECS/SDE guidelines and suggests that such methods should have the following characteristics: (a) be performance-based, including observation and work samples; (b) include information gathered over time from a wide range of experiences; (c) assess a child's progress in all levels of learning within all developmental domains; (d) be based

on an understanding of developmental sequences and individual learning styles; and (e) provide information that is useful for instructing the individual child.

Two Complementary Components

Two complementary components make up the Project Construct Assessment System--the Formative Assessment Program and the Inventory. While each component has a distinct function and structure, both parts utilize multiple sources of information that are primarily collected over extended periods of time by teachers.

Formative Assessment Program.

The Formative Assessment Program is designed to be used by teachers to monitor the day-to-day progress toward goal attainment of students ages three through seven. Results are used to adjust the learning and instructional environment to better meet students' needs and may be summarized to show a student's growth over time.

Seventeen Learning/Assessment Experiences that are consistent with the ways children learn and are linked to the curricular goals provide the structure for the Formative Assessment Program. In addition, a number of data-gathering, evaluation, and reporting forms have been developed. Teachers use the experiences and forms to assess and evaluate students via a variety of informal, performance-based methods, such as observation and work samples.

Inventory.

The Inventory consists of a set of structured assessment activities, each of which measures one or two of the curricular goals. At the present time, Inventory activities are limited to

goals in the Cognitive Domain and the Language Development Area of the Representational Domain, although guidelines are being developed to facilitate assessment of goals in the Sociomoral Domain and the Symbolic Development Area of the Representational Domain. The Inventory is designed so that a child can be assessed on only the goal(s) of interest.

Performance tasks, interviews, and portfolio collections comprise the formats for the various activities. Each activity has specified administration and scoring procedures and is scored according to a four-point rubric. An activity may involve one or two children, although assessment should be done on only one child at a time.

Like the Formative Assessment Program, the Inventory is designed to be used by teachers. However, the Inventory is appropriate for children ages four and one-half through seven and is most useful for summative or placement evaluation (e.g., Chapter 1) or for verifying results of the Formative Assessment Program.

Initial Validation Methodology

Validity

Messick (1989) has defined validity as

> an integrated evaluative judgment of the degree to which empirical evidence and theoretical rationales support the adequacy and appropriateness of inferences and actions based on test scores or other modes of assessment. (p. 13)

Noting that validity is a unitary concept, Messick identifies three major categories of validity evidence: (a) content-related, (b) criterion-related, and (c) construct-related. He states that with respect to test use, "general evidence supporting construct validity usually needs to be buttressed by specific evidence of the relevance of the test to the applied purpose and the utility of the test in the applied setting" (p. 20).

Procedures

The initial procedures for validating the Project Construct Assessment System were established to be in concert with Messick's (1989) perspective. They have also been designed to be in compliance with the Standards for Educational and Psychological Testing (AERA, APA, NCME, 1985), which state that the "process of compiling construct-related evidence for test validity starts with test development" (p. 10) and that "content-related evidence of validity is a central concern during test development" (p. 11).

Although the Project Construct validation procedures were conceived prior to the recent publication of criteria for validating new forms of educational tests (Linn, Baker, & Dunbar, 1991), they are quite consistent with these new expectations. The Linn et al. criteria are in keeping with "an expanded framework of validity concepts," which "can help to clarify the kinds of information that alternative forms of assessment offer" (p. 16). Linn and his colleagues assert that "serious validation of alternative assessments needs to include evidence regarding" consequences, generalizability, fairness, cognitive complexity,

meaningfulness, content quality and coverage, and cost justification.

Because the Project Construct Assessment System is still under construction, this paper focuses on the procedures that have been or are being implemented during the development phase. At every step in the six-year development process, efforts have been and continue to be made to ensure that the Project Construct Assessment System will yield valid results. Detailed descriptions of these efforts follow.

Constructivist input.

Shepard (1991) has argued that psychometricians should make their beliefs about learning explicit. In accordance, the developers of the Project Construct Assessment System acknowledge that it is, as was previously noted, firmly rooted in constructivist theory. To facilitate an accurate translation of theory into practice, specialists in constructivism have assisted with every phase of development of the entire Project Construct framework, including the Assessment System, by acting as advisers, writers, and reviewers.

Three nationally recognized experts in early childhood constructivist education have served as long-term consultants to the project, meeting frequently with staff to review drafts of the Goals for Students that would ultimately become the heart of the framework and be assessed by the system. After the goals were finalized, the three consultants reviewed numerous drafts of the Curriculum and Assessment Specifications for the Goals for Students. Once closure was reached on the specifications, they

offered suggestions for and reviewed drafts of assessment procedures and activities. Their services have been augmented by the efforts of several practicing constructivist educators, who provide an applied perspective. The constant involvement of constructivists in the development process has served to strengthen the project's ties to constructivist theory.

Consensus building.

A consensus-building process involving a large number of professionals from many fields, including curriculum, instruction, early childhood education, and psychology, was used to finalize the curricular goals and, subsequently, the Curriculum and Assessment Specifications for the goals. During the first two years of development, a group of fifteen educators from across the state met several times to provide feedback about the work done by project staff and consultants and to make specific suggestions for revisions. In subsequent years, this advisory group expanded and ultimately included over a hundred individuals. Differences in opinion were resolved through lengthy discussions that provided a forum for debate about the most appropriate ways to promote developmentally appropriate curriculum, instruction, and assessment.

Survey methodology.

At the end of the third year of the project, the proposed Goals for Students were validated using survey methodology. Approximately 1700 surveys and sets of specifications were mailed to early childhood teachers and school administrators in all Missouri school districts and to early childhood educators across

the nation. Respondents were asked to rate each proposed goal with respect to its importance for inclusion in the curriculum and assessment framework. A five-point scale was used to assess the degree of importance: (a) Not, (b) Slightly, (c) Moderately, (d) Very, and (e) Extremely. (Ratings were also obtained about the clarity and effectiveness of the overview of the project and the explanations of the developmental domains.)

Six hundred and forty-seven respondents completed and returned the survey, for a response rate of approximately 38 percent. Table 1 shows the results for the entire sample.

Insert Table 1 about here

Analysis of the data suggested that educators viewed every one of the proposed goals as worthy of inclusion in the framework, given that the majority of respondents rated each goal as either Very Important or Extremely Important. However, the Representation goals and the Conventional Knowledge goals received larger proportions of Moderately Important ratings than did any of the other goals.

Approximately 60 respondents sent narrative comments along with their numerical ratings; their remarks provided the impetus for the reorganization of the Language goals and the rewording of a few of the other goals. A number of respondents recommended the addition of a fourth domain, Physical Development. All of these revisions were endorsed by the project advisers.

Congruence reviews.

Congruence reviews for the Project Construct Assessment System have been conducted according to a hierarchical scheme. The first level of review occurred when the fifteen members of the statewide advisory group evaluated the Curriculum and Assessment Specifications for congruence with the respective goal.

The next level of review was aimed at the Formative Assessment Program. Members of the statewide advisory group served again as reviewers, examining the Learning/Assessment Experiences for consistency with the principles of constructivist education (as delineated by DeVries and Kohlberg, 1987/1990) and for compatibility with the Goals for Students.

The third tier in the review process involved the three original constructivist consultants, along with three other nationally recognized experts in early childhood curriculum and assessment. These six experts reviewed drafts of the Inventory activities in order to determine whether each activity was congruent with the goal (including the cognitive processes implied by the goal) that it was intended to assess, as per the criteria for validating performance assessment instruments established by Linn et al.(1991). The reviewers also judged whether the activities were consistent with the tenets of constructivist theory and with the criteria for developmentally appropriate assessment (Gnezda et al., 1991; NAEYC & NAECS/SDE, 1991).

As would be expected, each of the three congruence reviews resulted in revisions to the system. The Curriculum and Assessment Specifications and the Learning/Assessment Experiences

were modified slightly. The Inventory activities assessing the Language goals are being substantially revised, while the activities assessing other goals are undergoing minor changes.

Meaningfulness reviews.

There were opportunities within both the second and third levels of the congruence reviews to informally determine, as per the Linn et al. (1991) criteria, how meaningful the Formative Assessment Program Learning/Assessment Experiences and the Inventory activities are to teachers. All of the experiences and all but two of the activities were deemed to be meaningful; the two problematic activities have been deleted from the Inventory.

There has not, however, been a systematic attempt to ascertain how meaningful the experiences and activities are to students, as Linn et al. advocate. However, teachers' anecdotal data and project staff's observations suggest that children find them engaging and relevant.

Cross-cultural/bias reviews.

Project Construct material is intended to be used with students from diverse cultures, and this consideration has permeated every phase of development. All pieces of the framework have been scrutinized for cultural and gender biases and for stereotypic language. Furthermore, the Inventory activities will be formally reviewed for fairness, in accordance with recommendations for validating performance-based assessment instruments (Linn et al., 1991).

Pilot testing.

The various pieces of the Project Construct Assessment System--the material making up the Formative Assessment Program and the activities developed for the Inventory--have been pilot tested during the past three years by over 100 classroom teachers. Participating teachers were convened several times each year during the third and fourth years of the project for training. Project staff frequently traveled to classrooms to observe teachers using the assessment material and to solicit their reactions to it. In addition, teachers made video recordings of their experiences in assessing students with the Inventory activities. The staff used the videotapes extensively, along with teachers' written comments and student data, to evaluate the activities.

The components of the Assessment System have been extensively revised based on the analyses of teachers' feedback and students' responses. One major change that occurred as a result of one of the later pilot studies, which was supported by several of the national consultants, was the deletion of a Logico-Mathematical goal, "order things according to relative differences." This goal became an indicator for assessment within the goal, "constructs classificatory relationships."

Training.

In addition to the procedures delineated previously, the validity of the Project Construct Assessment System (and the overall approach to education embraced by the framework) is maximized by the extensive training provided to teachers who are

interested in using project material. Teachers and administrators desiring to implement Project Construct must attend a one-week institute and three one-day follow-up sessions, where they receive comprehensive instruction in all facets of the framework and especially in the utilization of the Assessment System.

Future Validation Efforts

Additional validity studies designed to gather criterion-related evidence to support the use of the Inventory for placement purposes will be conducted as soon as the Project Construct Assessment System is in final form. Factor analytic studies will also be conducted on Inventory data to collect further evidence for its construct-related validity. In order to satisfy the Linn et al. criteria (1991), studies will also need to be done on the Inventory activities to determine how well performance on them transfers or generalizes across tasks and to broader domains. (Future work on the Inventory will also include the collection of empirical data that, in conjunction with judgmental methods, will be used to set performance standards for the activities. Reliability studies are also planned.)

In keeping with Messick's (1989) view that attention must be paid to the consequences of test use and in response to calls (Linn et al.; Shepard, 1991) for investigations of consequential validity, studies should be conducted to determine whether the Project Construct framework in general and the Assessment System in particular are making positive differences in early childhood

education. Finally, some attention will have to be paid to the issue raised by Linn et al. of cost justification.

Summary and Implications

The Project Construct Assessment System represents an innovative approach to measuring young children's developmental progress on 26 widely endorsed curricular goals. The system represents a response to the call for more authentic, performance-based assessment instruments and an alternative to less appropriate, more traditional evaluation techniques. A variety of procedures have been built into the development process to ensure that the Project Construct Assessment System will yield valid results. These procedures have incorporated (or in the future will include) conventional methods that are routinely applied to tests of all types as well newer criteria that have been suggested for performance-based instruments.

The process of validating the Project Construct Assessment System has been somewhat complex, primarily because of the continuous dialogue between project staff, expert consultants, and practicing educators. However, these conversations were essential in order for this type of assessment system to be credible as well as to yield valid results. It would be impossible to create and implement this kind of theoretically based, comprehensive program without input from and the consensus of the constituents who will utilize it.

The process described in this paper can serve as model for the validation of performance-based instruments for use at every

grade, not just at the preschool and primary levels. The development and validation of the Project Construct Assessment System demonstrates that consensus between measurement specialists and educators from other fields can be achieved through collaboration and that technical rigor need not be sacrificed in order to attain reform in testing practices.

Table 1

Proportion of Validation Survey Respondents Marking Each Rating Option

Proposed goal	Scale point 1	2	3	4	5
Complete sample (N = 647)					
Social Relationships:					
build relationships with adults	.008	.003	.025	.311	.653
build relationships with peers	.008	.003	.011	.277	.701
consider perspectives of others	.009	.008	.044	.429	.509
negotiate and apply rules	.008	.005	.061	.439	.487
Dispositions:					
be curious	.006	.006	.052	.359	.577
have initiative	.002	.009	.034	.342	.613
be confident	.002	.008	.025	.229	.737
be creative	.008	.006	.120	.389	.477
Physical Knowledge:					
act on objects/observe reactions	.008	.005	.095	.427	.465
act on objects/produce desired effect	.008	.006	.110	.412	.464
Conventional Knowledge:					
know personal information	.000	.008	.088	.344	.560
know about community and social roles	.000	.013	.165	.491	.331
know conventional notations	.000	.032	.193	.428	.347
Logico-Mathematical Knowledge:					
construct classificatory relationships	.000	.006	.094	.424	.476
order things...relative difference	.002	.009	.122	.421	.446
construct numerical relationships	.000	.008	.083	.384	.524
construct spatial/temporal relationships	.000	.016	.129	.434	.421
Representation:					
represent ideas/feelings...pretend play	.008	.013	.132	.355	.492
represent ideas/feelings...movement	.009	.027	.216	.434	.313
represent ideas/feelings...music	.009	.060	.276	.400	.254
represent ideas/feelings...graphic arts	.008	.045	.237	.392	.317
Language:					
use language for variety of purposes	.000	.009	.028	.200	.762
perceive self as listener/.../writer	.000	.014	.038	.213	.735
understand correspondence...	.008	.008	.041	.294	.649
use cues to construct meaning	.005	.003	.066	.317	.610
respond to literature in various ways	.002	.008	.133	.378	.479
develop a sense of story	.002	.014	.072	.395	.517
understand conventions of print	.005	.016	.118	.372	.490

Note. On the rating scale, 1 = Not Important and 5 = Extremely Important.

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Appendix A

Project Construct
Goals for Students

Sociomoral Domain
- Area: Social Relationships
  - Build relationships of mutual trust and respect with adults.
  - Build relationships with peers.
  - Consider the perspectives of others.
  - Negotiate and apply rules.
- Area: Dispositions
  - Be curious.
  - Take initiative.
  - Be confident.
  - Be creative.

Cognitive Domain
- Area: Logico-Mathematical Knowledge
  - Construct classificatory relationships.
  - Construct numerical relationships.
  - Construct spatial and temporal relationships.
- Area: Physical Knowledge
  - Act on objects and observe reactions.
  - Act on objects to produce desired effects.
- Area: Conventional Knowledge
  - Know personal information.
  - Know about the community.
  - Know conventional notations, manners, and customs.

Representational Domain
- Area: Symbolic Development
  - Represent ideas and feelings through pretend play.
  - Represent ideas and feelings through movement.
  - Represent ideas and feelings through music.
  - Represent ideas and feelings through art and construction.
- Area: Language Development
  - Use language for a variety of functions.
  - Expand and refine the form and organization of language.
  - Construct meaning from language.
  - Represent ideas and feelings through language.

Physical Development Domain
- Area: Motor Skills
  - Develop motor skills for personally meaningful purposes.
- Area: Health and Safety
  - Develop healthy living practices.

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Appendix B

Example of A Curriculum and Assessment Specification for A *Project Construct* Goal for Students

6 Sociomoral Domain

Goal: Build relationships with peers.

Description of Goal:

The social give-and-take of peer relationships provides a good forum for the development of intellectual and moral autonomy. A school environment offers numerous opportunities for children to build peer relationships. When children share their ideas and feelings as they engage in pretend play, sing and make music together, share books, explore the physical environment, collaborate on class journals, create with paints or woodworking materials, make up rules for games, or help with snack time and clean up, they grow socially as well as intellectually. Through peer interactions the child learns to communicate ideas and desires, build trust, negotiate, and collaborate. Peer interactions stimulate the development of friendships and foster relationships characterized by caring and mutual responsibility. Furthermore, in the process of attempting to solve everyday problems and resolve conflicts, children develop a critical frame of mind. As children learn to consider the views of others, they become increasingly able to tolerate differences of opinion. Even such an apparently simple negotiation as deciding who goes first in playing a game requires a great deal of understanding on the part of the child. The three-year-old who says, "You go first and then I'll go first" may not know what adults mean by "first," but he clearly understands a great deal about the social environment. He knows that games have rules, for example, and that individuals generally take turns in playing. He also knows enough about the perspectives of others to realize that a number of people might want to go first.

Possible Indicators for Assessment:

Expresses interest in peers.

Example/Elaboration: Observes others; tries to enter play; initiates conversation; admires others' accomplishments, belongings, or family; asks about a classmate.

Engages in sustained periods of play with another child.

Example/Elaboration: Listens to a book-on-tape with another child; plays with one or more children for at least twenty minutes; plays a game or works on a project with a friend; listens to songs together; plays musical instruments; plays chasing games.

Demonstrates consideration for peers.

Example/Elaboration: Helps a child who has fallen; puts arm around someone who is crying; takes turns; consoles a child who loses; reads and listens to others; decides how to share materials; listens while another explains own ideas; invites another to play ball.

Works with peers to generate ideas.

Example/Elaboration: Makes plans to play with a peer; chooses costumes for role-playing; chooses material for an art project; designs a town out of blocks; plans to work together in particular areas or on particular projects; decides with others to create new game strategies or a new game; during pretend play organizes a marching band or a parade; figures out how to make sound effects for a play; produces a puppet show.

Forms special friendships.

Example/Elaboration: Plays together at recess, sits next to each other at group time; has a "best friend"; writes stories about friends; writes letters to friends; consistently asks one child to read to him/her; talks about friends.

Uses peers as resources.

Example/Elaboration: Asks for help ("Dustin, show me how to make a D"; "Where's Shannon? She knows how to read"); asks for help to learn or win a game ("Joey, show me how to play this right"); asks peer to read; asks someone to teach a new song.

Offers resources to peers.

Example/Elaboration: Offers to read to others; shares pencils; offers to tie another's shoes; helps another child to count; shows another child how to make a winning move in checkers; reads game rules to a child who can't read; teaches a new game; offers comfort to a friend in need; offers to share; passes out snacks.

Masters own aggressive impulses.

Example/Elaboration: Inhibits impulsive or aggressive reactions; uses words to explain feelings; is a "good loser"; maintains control when circumstances are unfavorable.

Resolves conflicts.

Example/Elaboration: "Lydia and I are going out in the hall to talk over a problem"; works to keep a game going; attempts to be friendly after a conflict; works to arrive at a compromise when problems arise; recognizes that people have to make choices when resources are scarce; uses words to deal with problems.

Possible Experiences for Assessment:

Art
Board/Card Games
Construction
Distributing Things
Dramatic Play
Exercise Play
Listening to Stories
Meeting/Discussion
Music
Personal Writing

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